

IN THE CLAIMS:

For the convenience of the Examiner, the pending claims are as follows:

1. (original) A medical system comprising:
 - a medical instrument to be guided in a patient body,
 - X-Ray acquisition means for acquiring a two-dimensional X-ray image comprising a projection of said medical instrument in accordance with a geometry of said X-Ray acquisition means,
 - ultrasound acquisition means for acquiring a three-dimensional ultrasound data set of said medical instrument using an ultrasound probe,
 - means for localizing said ultrasound probe within a referential of the X-ray acquisition means,
 - means for providing a first ultrasound localization of said medical instrument within a referential of said ultrasound acquisition means,
 - means for converting said first ultrasound localization within said referential of the ultrasound acquisition means into a first X-ray localization within said referential of the X-ray acquisition means, using said localization of the ultrasound probe,
 - means for providing a second X-ray localization of said projection of the medical instrument in a referential of said two-dimensional X-ray image,
 - means for mapping said three-dimensional ultrasound data set with said two-dimensional X-ray image in accordance with a transformation, which minimizes a distance between a projection of said first X-ray localization on said two-dimensional X-Ray image in accordance with said geometry of the X-Ray acquisition means and said second X-ray localization,
 - means for generating and displaying a bi-modal representation of said medical instrument in which said two-dimensional X-ray image and said mapped three-dimensional ultrasound data set are combined.
2. (original) A system as claimed in claim 1, wherein said means for providing a first ultrasound localization and said means for providing a second X-Ray localization of said medical instrument comprise detection means for detecting localization features of said medical instrument.

3. (original) A system as claimed in claim 2, wherein said localization features comprise a landmark of said medical instrument.
4. (original) A system as claimed in claim 3, wherein said transformation comprises a translation.
5. (original) A system as claimed in claim 2, wherein said localization features comprise a plurality of landmarks of said medical instrument.
6. (original) A system as claimed in claim 5, wherein said transformation comprises a translation and three rotations.
7. (original) A system as claimed in claim 1, wherein said transformation is intended to minimize a three-dimensional displacement of said first X-Ray localization.
8. (original) A system as claimed in claim 5, wherein said plurality of landmarks belongs to said medical instrument and to at least a first and a second reference medical instruments.
9. (original) A system as claimed in claim 1, wherein said ultrasound probe localization allows to define a crop plane, which delimitates in the 3D ultrasound data set data to be removed from data to be used by the generating and display means for generating said bi-modal representation.
10. (original) A method of guiding a medical instrument in a patient body, comprising the steps of:
 - acquiring a two-dimensional X-ray image using an X-ray acquisition system, said two-dimensional X-ray image comprising a projection of said medical instrument in accordance with a geometry of said X-ray acquisition system,
 - acquiring a three-dimensional ultrasound data set of said medical instrument using said ultrasound probe,
 - localizing said ultrasound probe in a referential of said X-ray acquisition system,
 - providing a first localization of said medical instrument within a referential of said 3D ultrasound data set,

- converting said first localization within said referential of the 3D ultrasound data set into a first X-Ray localization within said referential of the X-ray acquisition system,
- providing a second localization of said projection of the medical instrument in a referential of the two-dimensional X-Ray image,
- mapping said three-dimensional ultrasound data set with said two-dimensional X-ray image in accordance with a transformation, which minimizes a distance between a projection of said first X-Ray localization on said two-dimensional X-Ray image in accordance with said geometry of the X-Ray acquisition means and said second localization,
- generating and displaying a bimodal representation of said medical instrument in which both 2D X-ray image and said mapped 3D ultrasound data are combined.